Abstract :

Snake game is one of the most popular arcade games of all time. In this game, the main objective of the player is to catch the maximum number of food without hitting the wall or itself. Creating a snake game can be taken as a challenge while learning Python or Pygame. It is one of the best beginner-friendly projects that every novice programmer should take as a challenge. Learning to build a video game is kinda interesting and fun learning.

Installing Pygame:

The first thing you will need to do in order to create games using Pygame is to install it on your systems. To do that, you can simply use the following command:

```
pip install pygame
```

Once that is done, just import Pygame and start off with your game development. Before moving on, take a look at the Pygame functions that have been used in this Snake Game along with their descriptions.

Function Used :

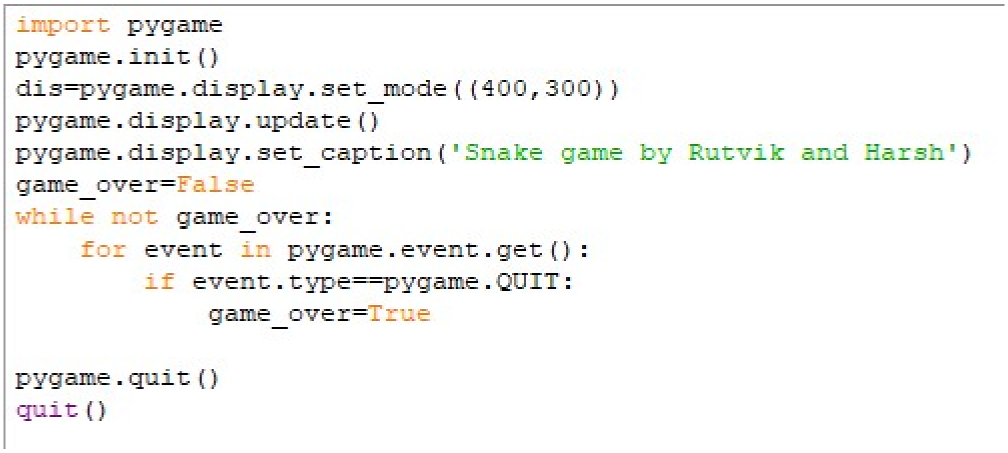
Function	Description
init()	Initializes all of the imported Pygame modules (returns a tuple indicating success and failure of initializations)
display.set_mode()	Takes a tuple or a list as its parameter to create a surface (tuple preferred)
update()	Updates the screen
quit()	Used to uninitialize everything

set_caption()	Will set the caption text on the top of the display screen
event.get()	Returns list of all events
Surface.fill()	Will fill the surface with a solid color
time.Clock()	Helps track time time
font.SysFont()	Will create a Pygame font from the System font resources

Create the Screen:

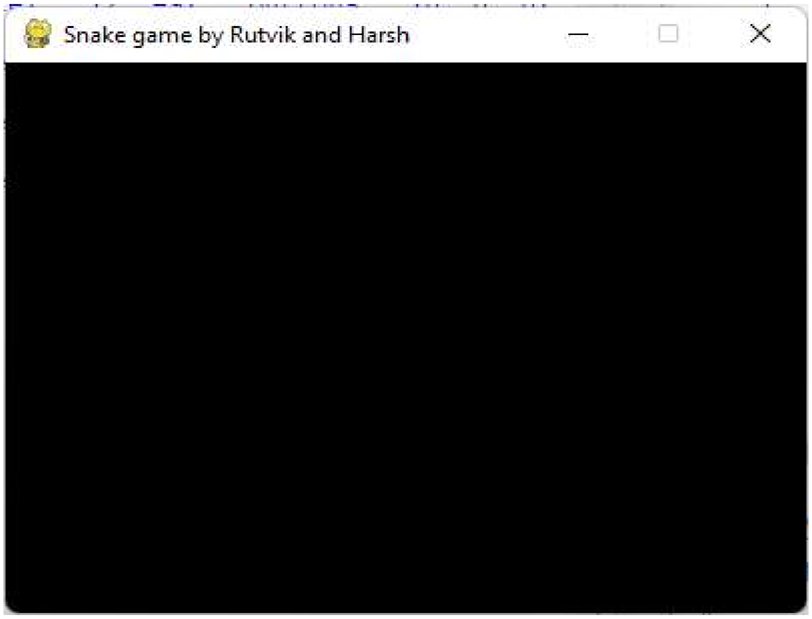
To create the screen using Pygame, you will need to make use of the *display.set_mode()* function. Also, you will have to make use of the *init()* and the *quit()* methods to initialize and uninitialize everything at the start and the end of the code. The *update()* method is used to update any changes made to the screen. There is another method i.e *flip()* that works similarly to the update() function. The difference is that the update() method updates only the changes that are made (however, if no parameters are passed, updates the complete screen) but the flip() method redoes the complete screen again.

CODE:



```
import pygame
pygame.init()
dis=pygame.display.set_mode((400,300))
pygame.display.update()
pygame.display.set_caption('Snake game by Rutvik and Harsh')
game_over=False
while not game_over:
    for event in pygame.event.get():
        if event.type==pygame.QUIT:
            game_over=True

pygame.quit()
quit()
```

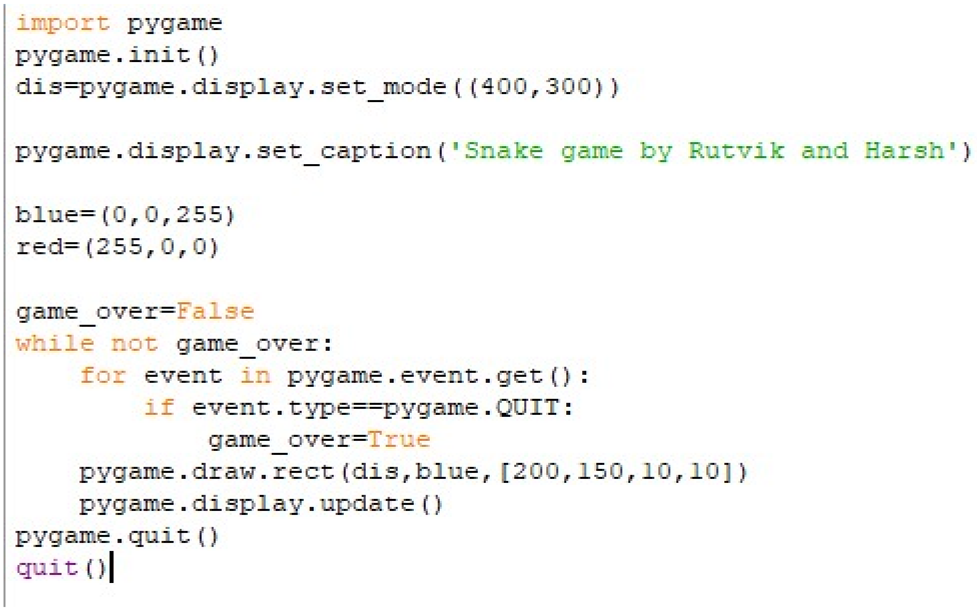
OUTPUT:



Create the Snake:

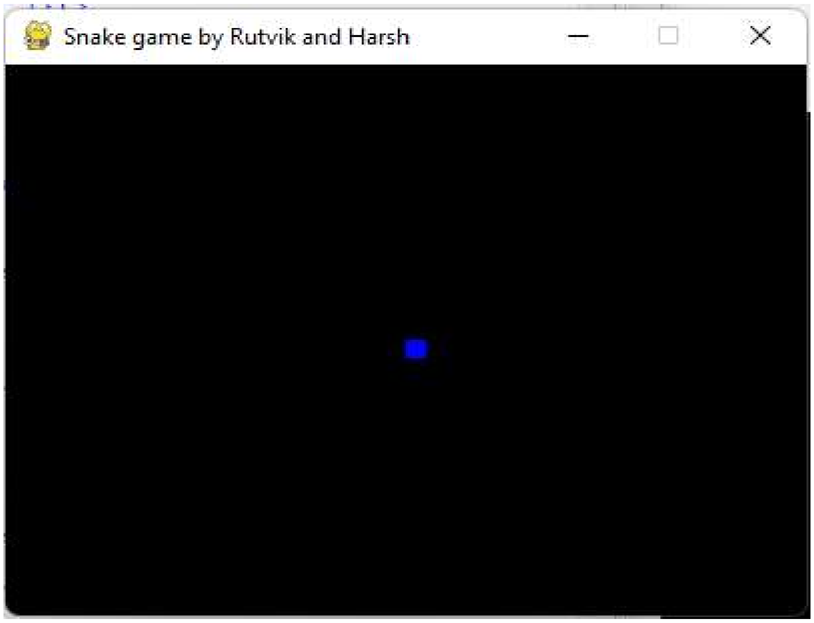
To create the snake, I will first initialize a few color variables in order to color the snake, food, screen, etc. The color scheme used in Pygame is RGB i.e “Red Green Blue”. In case you set all these to 0’s, the color will be black and all 255’s will be white. So our snake will actually be a rectangle. To draw rectangles in Pygame, you can make use of a function called *draw.rect()* which will help yo draw the rectangle with the desired color and size.

CODE:



```
import pygame
pygame.init()
dis=pygame.display.set_mode((400,300))

pygame.display.set_caption('Snake game by Rutvik and Harsh')

blue=(0,0,255)
red=(255,0,0)

game_over=False
while not game_over:
    for event in pygame.event.get():
        if event.type==pygame.QUIT:
            game_over=True
    pygame.draw.rect(dis,blue,[200,150,10,10])
    pygame.display.update()
pygame.quit()
quit()
```

OUTPUT:


Snake game by Rutvik and Harsh

As you can see, the snakehead is created as a blue rectangle. The next step is to get your snake moving.

Moving the Snake:

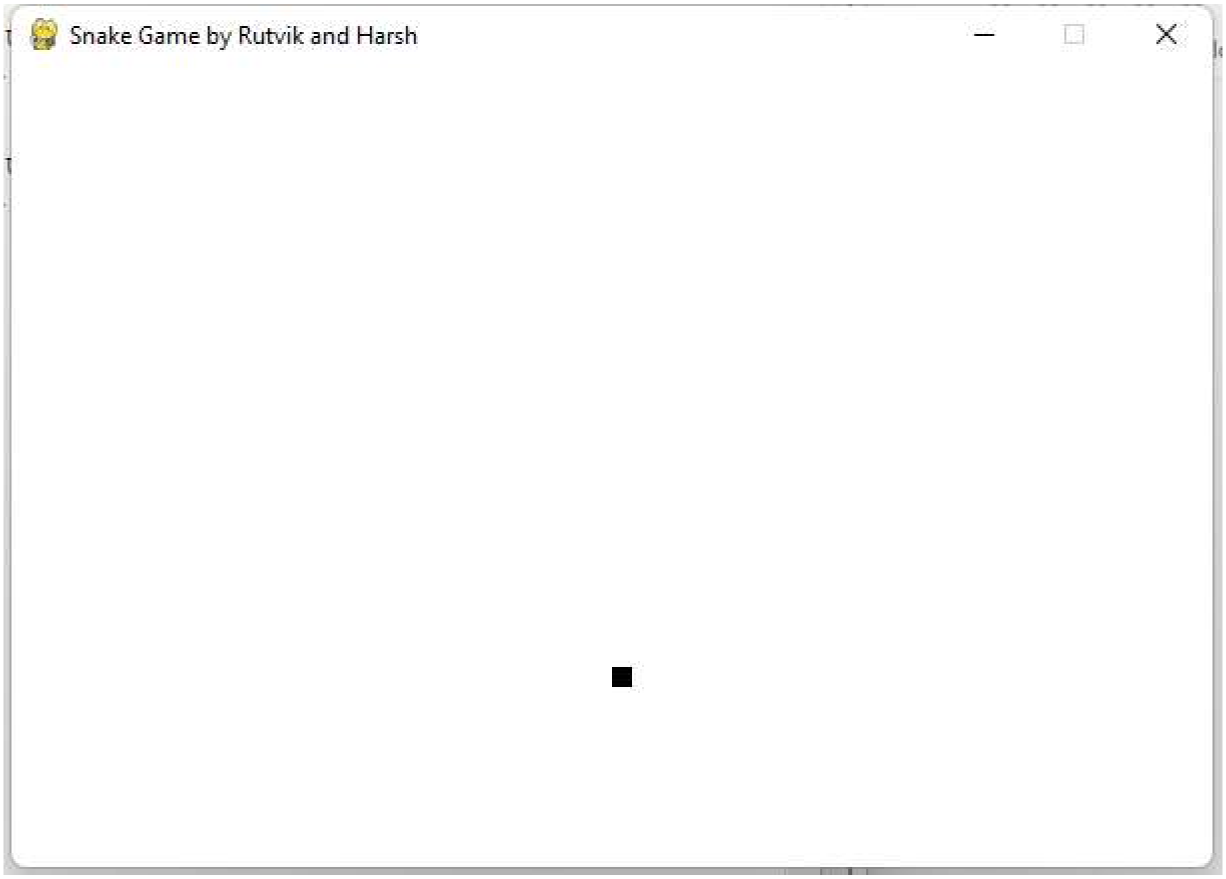
To move the snake, you will need to use the key events present in the KEYDOWN class of Pygame. The events that are used over here are, K_UP, K_DOWN, K_LEFT, and K_RIGHT to make the snake move up, down, left and right respectively. Also, the display screen is changed from the default black to white using the *fill()* method.

I have created new variables *x1_change* and *y1_change* in order to hold the updating values of the x and y coordinates.

CODE:

```
import pygame

pygame.init()

white = (255, 255, 255)
black = (0, 0, 0)
red = (255, 0, 0)

dis = pygame.display.set_mode((800, 600))
pygame.display.set_caption('Snake Game by Rutvik and Harsh')

game_over = False

x1 = 300
y1 = 300

x1_change = 0
y1_change = 0

clock = pygame.time.Clock()

while not game_over:
    for event in pygame.event.get():
        if event.type == pygame.QUIT:
            game_over = True
        if event.type == pygame.KEYDOWN:
            if event.key == pygame.K_LEFT:
                x1_change = -10
                y1_change = 0
            elif event.key == pygame.K_RIGHT:
                x1_change = 10
                y1_change = 0
            elif event.key == pygame.K_UP:
                y1_change = -10
                x1_change = 0
            elif event.key == pygame.K_DOWN:
                y1_change = 10
                x1_change = 0

    x1 += x1_change
    y1 += y1_change
    dis.fill(white)
    pygame.draw.rect(dis, black, [x1, y1, 10, 10])

    pygame.display.update()

    clock.tick(30)

pygame.quit()
quit()
```

OUTPUT:



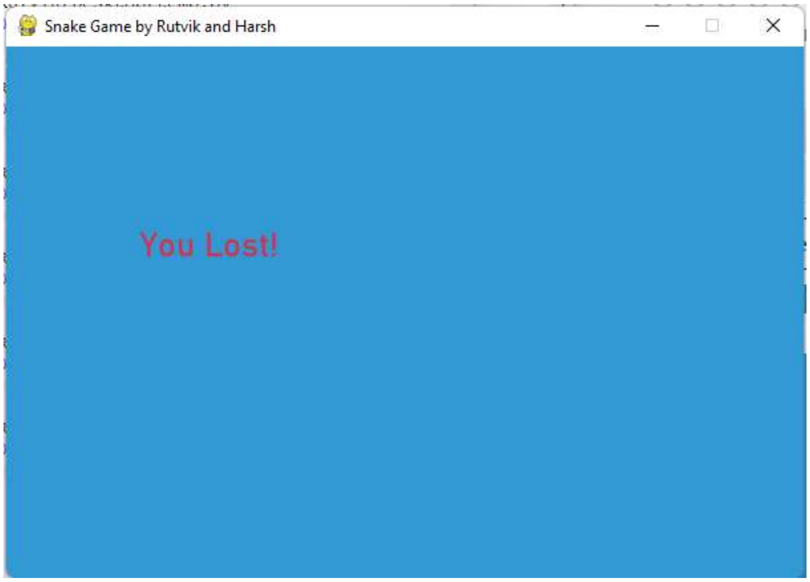
Game Over when Snake hits the boundaries:

In this snake game, if the player hits the boundaries of the screen, then he loses. To specify that, I have made use of an ‘if’ statement that defines the limits for the x and y coordinates of the snake to be less than or equal to that of the screen. Also, make a not over here that I have removed the hardcodes and used variables instead so that it becomes easy in case you want to make any changes to the game later on.

CODE:

```
import pygame
import time
pygame.init()

white = (255, 255, 255)
black = (0, 0, 0)
red = (255, 0, 0)

dis_width = 600
dis_height  = 400
dis = pygame.display.set_mode((dis_width, dis_width))
pygame.display.set_caption('Snake Game by Rutvik and Harsh')

game_over = False

x1 = dis_width/2
y1 = dis_height/2

snake_block=10

x1_change = 0
y1_change = 0

clock = pygame.time.Clock()
snake_speed=30

font_style = pygame.font.SysFont(None, 50)

def message(msg,color):
    mesg = font_style.render(msg, True, color)
    dis.blit(mesg, [dis_width/2, dis_height/2])

while not game_over:
    for event in pygame.event.get():
        if event.type == pygame.QUIT:
            game_over = True
        if event.type == pygame.KEYDOWN:
            if event.key == pygame.K_LEFT:
                x1_change = -snake_block
                y1_change = 0
            elif event.key == pygame.K_RIGHT:
                x1_change = snake_block
                y1_change = 0
            elif event.key == pygame.K_UP:
                y1_change = -snake_block
                x1_change = 0
            elif event.key == pygame.K_DOWN:
                y1_change = snake_block
                x1_change = 0

    if x1 >= dis_width or x1 < 0 or y1 >= dis_height or y1 < 0:
        game_over = True

    x1 += x1_change
    y1 += y1_change
    dis.fill(white)
    pygame.draw.rect(dis, black, [x1, y1, snake_block, snake_block])

    pygame.display.update()

    clock.tick(snake_speed)

message("You lost",red)
pygame.display.update()
time.sleep(2)

pygame.quit()
quit()
```

OUTPUT:



You Lost!

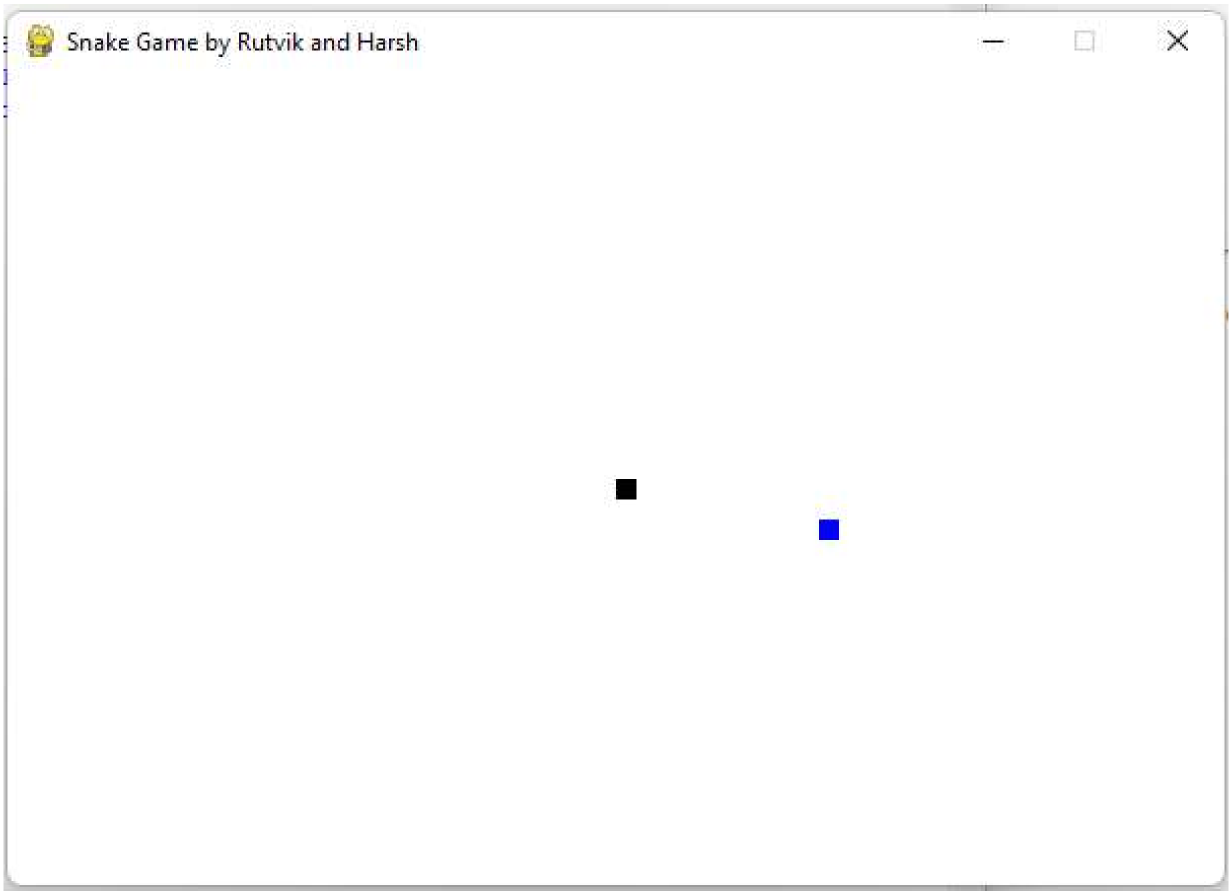
Adding the Food:

Here, I will be adding some food for the snake and when the snake crosses over that food, I will have a message saying “Yummy!!”. Also, I will be making a small change wherein I will include the options to quit the game or to play again when the player loses.

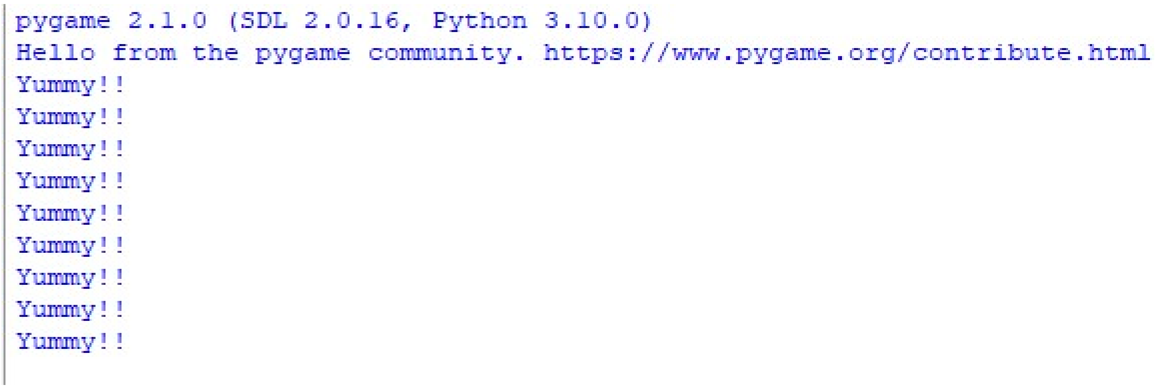
CODE:

```
import pygame
import time
import random

pygame.init()

white = (255, 255, 255)
black = (0, 0, 0)
red = (255, 0, 0)
blue = (0, 0, 255)

dis_width = 800
dis_height = 600

dis = pygame.display.set_mode((dis_width, dis_height))
pygame.display.set_caption('Snake Game by Rutvik and Harsh')

clock = pygame.time.Clock()

snake_block = 10
snake_speed = 30

font_style = pygame.font.SysFont(None, 30)


def message(msg, color):
    mesg = font_style.render(msg, True, color)
    dis.blit(mesg, [dis_width/3, dis_height/3])


def gameLoop():  # creating a function
    game_over = False
    game_close = False

    x1 = dis_width / 2
    y1 = dis_height / 2

    x1_change = 0
    y1_change = 0

    foodx = round(random.randrange(0, dis_width - snake_block) / 10.0) * 10.0
    foody = round(random.randrange(0, dis_width - snake_block) / 10.0) * 10.0

    while not game_over:

        while game_close == True:
            dis.fill(white)
            message("You Lost! Press Q-Quit or C-Play Again", red)
            pygame.display.update()
            for event in pygame.event.get():
                if event.type == pygame.KEYDOWN:
                    if event.key == pygame.K_q:
                        game_over = True
                        game_close = False
                    if event.key == pygame.K_c:
                        gameLoop()

        for event in pygame.event.get():
            if event.type == pygame.QUIT:
                game_over = True
            if event.type == pygame.KEYDOWN:
                if event.key == pygame.K_LEFT:
                    x1_change = -snake_block
                    y1_change = 0
                elif event.key == pygame.K_RIGHT:
                    x1_change = snake_block
                    y1_change = 0
                elif event.key == pygame.K_UP:
                    y1_change = -snake_block
                    x1_change = 0
                elif event.key == pygame.K_DOWN:
                    y1_change = snake_block
                    x1_change = 0

        if x1 >= dis_width or x1 < 0 or y1 >= dis_height or y1 < 0:
            game_close = True

        x1 += x1_change
        y1 += y1_change
        dis.fill(white)
        pygame.draw.rect(dis, blue, [foodx, foody, snake_block, snake_block])
        pygame.draw.rect(dis, black, [x1, y1, snake_block, snake_block])
        pygame.display.update()

        if x1 == foodx and y1 == foody:
            print("Yummy!!")
        clock.tick(snake_speed)

    pygame.quit()
    quit()


gameLoop()
```

OUTPUT:



Terminal :



```
pygame 2.1.0 (SDL 2.0.16, Python 3.10.0)
Hello from the pygame community. https://www.pygame.org/contribute.html
Yummy!!
Yummy!!
Yummy!!
Yummy!!
Yummy!!
Yummy!!
Yummy!!
Yummy!!
Yummy!!
```

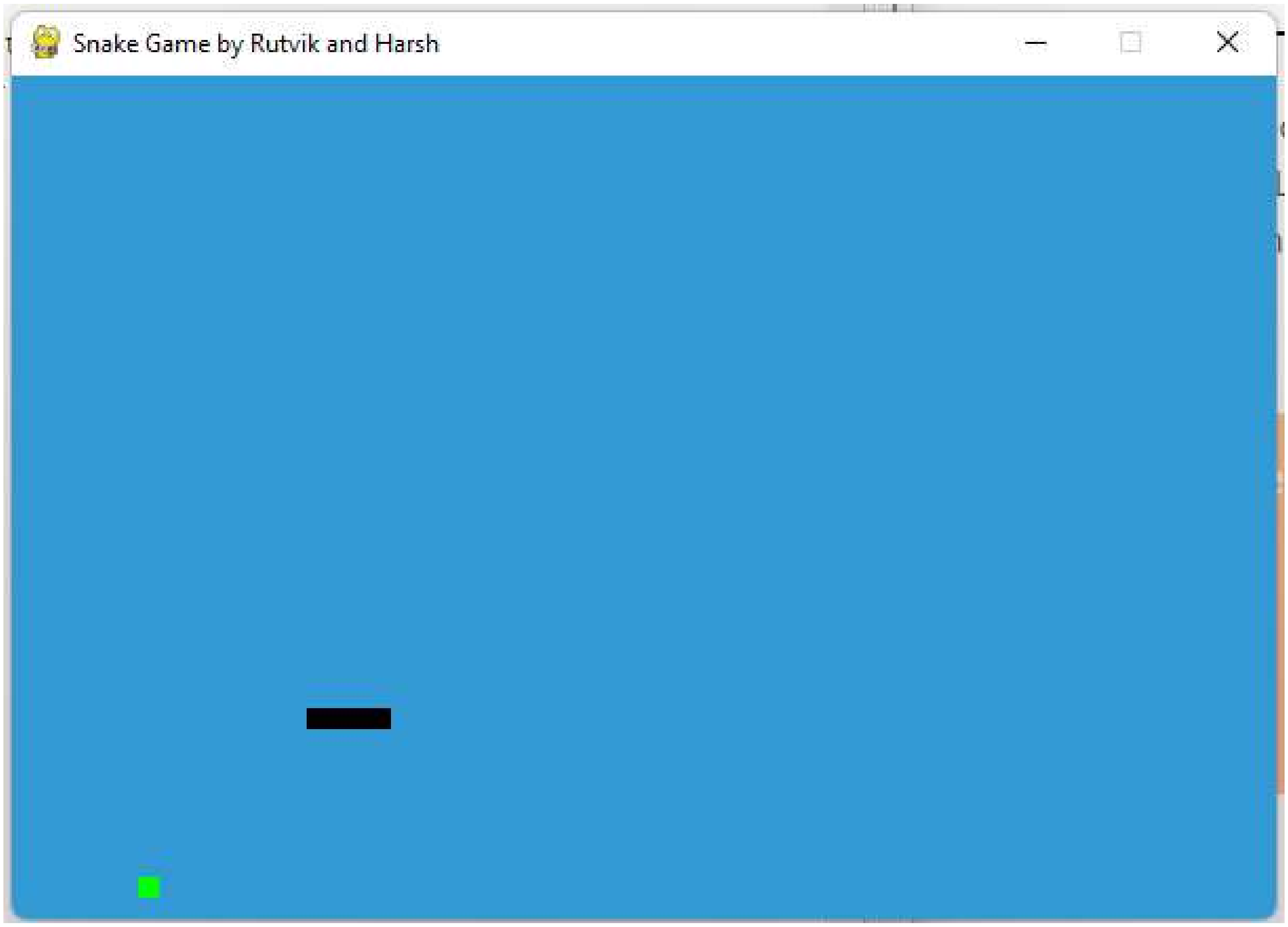
Increasing the Length of the Snake:

The following code will increase the size of our sake when it eats the food. Also, if the snake collides with his own body, the game is over and you ill see a message as “You Lost! Press Q-Quit or C-Play Again“. The length of the snake is basically contained in a list and the initial size that is specified in the following code is one block.

CODE :

```
import pygame
import time
import random

pygame.init()

white = (255, 255, 255)
yellow = (255, 255, 102)
black = (0, 0, 0)
red = (213, 50, 80)
green = (0, 255, 0)
blue = (50, 153, 213)

dis_width = 600
dis_height = 400

dis = pygame.display.set_mode((dis_width, dis_height))
pygame.display.set_caption('Snake Game by Rutvik and Harsh')

clock = pygame.time.Clock()

snake_block = 10
snake_speed = 15

font_style = pygame.font.SysFont("bahnschrift", 25)
score_font = pygame.font.SysFont("comicsansms", 35)

def our_snake(snake_block, snake_list):
    for x in snake_list:
        pygame.draw.rect(dis, black, [x[0], x[1], snake_block, snake_block])


def message(msg, color):
    mesg = font_style.render(msg, True, color)
    dis.blit(mesg, [dis_width / 6, dis_height / 3])


def gameLoop():
    game_over = False
    game_close = False

    x1 = dis_width / 2
    y1 = dis_height / 2

    x1_change = 0
    y1_change = 0

    snake_List = []
    Length_of_snake = 1

    foodx = round(random.randrange(0, dis_width - snake_block) / 10.0) * 10.0
    foody = round(random.randrange(0, dis_height - snake_block) / 10.0) * 10.0

    while not game_over:

        while game_close == True:
            dis.fill(blue)
            message("You Lost! Press C-Play Again or Q-Quit", red)

            pygame.display.update()

            for event in pygame.event.get():
                if event.type == pygame.KEYDOWN:
                    if event.key == pygame.K_q:
                        game_over = True
                        game_close = False
                    if event.key == pygame.K_c:
                        gameLoop()

        for event in pygame.event.get():
            if event.type == pygame.QUIT:
                game_over = True
            if event.type == pygame.KEYDOWN:
                if event.key == pygame.K_LEFT:
                    x1_change = -snake_block
                    y1_change = 0
                elif event.key == pygame.K_RIGHT:
                    x1_change = snake_block
                    y1_change = 0
                elif event.key == pygame.K_UP:
                    y1_change = -snake_block
                    x1_change = 0
                elif event.key == pygame.K_DOWN:
                    y1_change = snake_block
                    x1_change = 0

        if x1 >= dis_width or x1 < 0 or y1 >= dis_height or y1 < 0:
            game_close = True
        x1 += x1_change
        y1 += y1_change
        dis.fill(blue)
        pygame.draw.rect(dis, green, [foodx, foody, snake_block, snake_block])
        snake_Head = []
        snake_Head.append(x1)
        snake_Head.append(y1)
        snake_List.append(snake_Head)
        if len(snake_List) > Length_of_snake:
            del snake_List[0]

        for x in snake_List[:-1]:
            if x == snake_Head:
                game_close = True

        our_snake(snake_block, snake_List)


        pygame.display.update()

        if x1 == foodx and y1 == foody:
            foodx = round(random.randrange(0, dis_width - snake_block) / 10.0) *
10.0
            foody = round(random.randrange(0, dis_height - snake_block) / 10.0) *
10.0
            Length_of_snake += 1

        clock.tick(snake_speed)

    pygame.quit()
    quit()


gameLoop()
```

OUTPUT:



Displaying the Score:

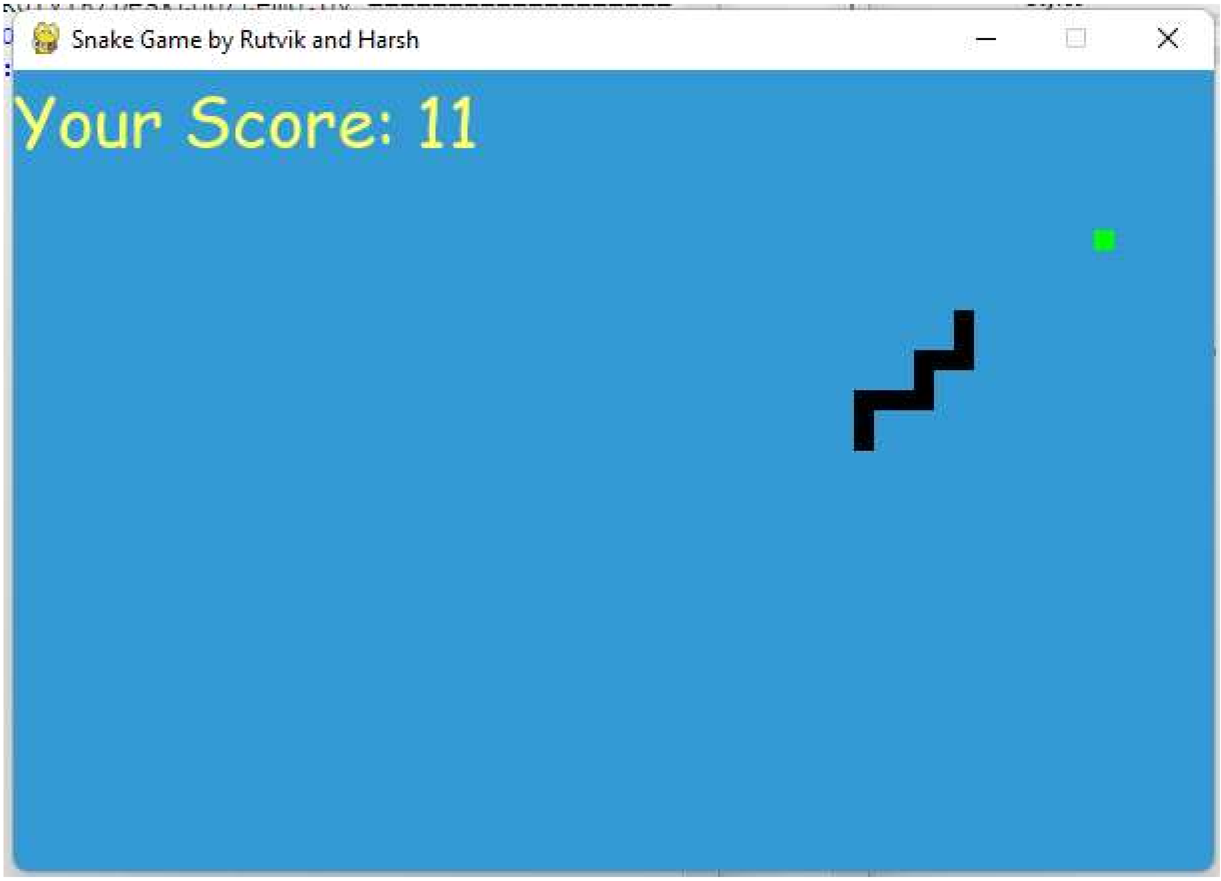
Last but definitely not the least, you will need to display the score of the player. To do this, I have created a new function as "Your_score". This function will display the length of the snake subtracted by 1 because that is the initial size of the snake.

CODE:

```
import pygame
import time
import random

pygame.init()

white = (255, 255, 255)
yellow = (255, 255, 102)
black = (0, 0, 0)
red = (213, 50, 80)
green = (0, 255, 0)
blue = (50, 153, 213)

dis_width = 600
dis_height = 400

dis = pygame.display.set_mode((dis_width, dis_height))
pygame.display.set_caption('Snake Game by Rutvik and Harsh')

clock = pygame.time.Clock()

snake_block = 10
snake_speed = 15

font_style = pygame.font.SysFont("bahnschrift", 25)
score_font = pygame.font.SysFont("comicsansms", 35)


def Your_score(score):
    value = score_font.render("Your Score: " + str(score), True, yellow)
    dis.blit(value, [0, 0])



def our_snake(snake_block, snake_list):
    for x in snake_list:
        pygame.draw.rect(dis, black, [x[0], x[1], snake_block, snake_block])


def message(msg, color):
    mesg = font_style.render(msg, True, color)
    dis.blit(mesg, [dis_width / 6, dis_height / 3])


def gameLoop():
    game_over = False
    game_close = False

    x1 = dis_width / 2
    y1 = dis_height / 2

    x1_change = 0
    y1_change = 0

    snake_List = []
    Length_of_snake = 1

    foodx = round(random.randrange(0, dis_width - snake_block) / 10.0) * 10.0
    foody = round(random.randrange(0, dis_height - snake_block) / 10.0) * 10.0

    while not game_over:

        while game_close == True:
            dis.fill(blue)
            message("You Lost! Press C-Play Again or Q-Quit", red)
            Your_score(Length_of_snake - 1)
            pygame.display.update()

            for event in pygame.event.get():
                if event.type == pygame.KEYDOWN:
                    if event.key == pygame.K_q:
                        game_over = True
                        game_close = False
                    if event.key == pygame.K_c:
                        gameLoop()

        for event in pygame.event.get():
            if event.type == pygame.QUIT:
                game_over = True
            if event.type == pygame.KEYDOWN:
                if event.key == pygame.K_LEFT:
                    x1_change = -snake_block
                    y1_change = 0
                elif event.key == pygame.K_RIGHT:
                    x1_change = snake_block
                    y1_change = 0
                elif event.key == pygame.K_UP:
                    y1_change = -snake_block
                    x1_change = 0
                elif event.key == pygame.K_DOWN:
                    y1_change = snake_block
                    x1_change = 0

        if x1 >= dis_width or x1 < 0 or y1 >= dis_height or y1 < 0:
            game_close = True
        x1 += x1_change
        y1 += y1_change
        dis.fill(blue)
        pygame.draw.rect(dis, green, [foodx, foody, snake_block, snake_block])
        snake_Head = []
        snake_Head.append(x1)
        snake_Head.append(y1)
        snake_List.append(snake_Head)
        if len(snake_List) > Length_of_snake:
            del snake_List[0]

        for x in snake_List[:-1]:
            if x == snake_Head:
                game_close = True

        our_snake(snake_block, snake_List)
        Your_score(Length_of_snake - 1)

        pygame.display.update()

        if x1 == foodx and y1 == foody:
            foodx = round(random.randrange(0, dis_width - snake_block) / 10.0) *
10.0
            foody = round(random.randrange(0, dis_height - snake_block) / 10.0) *
10.0
            Length_of_snake += 1

        clock.tick(snake_speed)
```

```
    pygame.quit()
    quit()


gameLoop()
```

OUTPUT:



With this, we have reached the end of this article on Snake Game in Python. I hope you are clear with all that has been shared with you in this Report.